



KEVIN YEH



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## The Road to hackNY

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Hi everyone! I talked quite a bit about why I chose to be a hackNY fellow [back in 2014](#), and almost a full year after the fact, I'm happy to say that being a hackNY fellow was, and continues to be, a much more wonderful experience than I could ever express in words.

With applications for the next round of fellows rolling in, I've had a couple of queries about what type of mysterious voodoo magic was mixed into my application to get me to where I am. I'm happy to say that there is, in fact, no magic, and that anyone can become a hackNY fellow with the right attitude and a passion for learning and collaboration!

To prove this point, my high school SAT prep tells me that I should provide examples and primary sources to develop my argument. To that effect, I resist my obsessive urge to revise and present, to you, my unedited 2015 hackNY application.

Please note that most applications aren't nearly as long or dense with information — but we'd always love to hear more about you!

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**Tell us about a time you built something awesome in code. How did you choose it? Why did you enjoy it?**

I have built several fantastic applications over the past year, including Blastro's flagship Android apps, which I have already written about extensively at [kyeh.me/blog](http://kyeh.me/blog). Although I enjoyed that individual act of love and labor, I recently got the chance to present my research project on Human-guided evolution of aesthetically-pleasing fractals with my partner, Tyler. Our research was immensely rewarding due to the incrementally more complex nature of our project over the past few months. Starting off with a desire to correlate mathematical structures and subjective beauty, we built a hybrid Java/C++ application backed by OpenGL to collect crowd-sourced data on aesthetically-pleasing fractals, then attempted to analyze the structural composition of those fractals to determine whether certain

equation forms and constants were more likely to produce interesting patterns and shapes. This data was used to evolve fractals using their X-Y equations as genetic DNA.

By the end of the semester, we had expanded our application into the 3-dimensional plane and planted the seeds for genetic evolution of fractal coloration using RGB value equations. We strived for a fast, easy-to-use Java Swing interface that would give control over to users, allowing them to evolve fractals and navigate through history trees to pick and combine fractals across generations, while providing a more powerful OpenGL interface that could be opened at any time to examine fractal structures and manually tweak and render them in high definition. It became a much larger project than either of us expected it to be, but we were ultimately proud of the work we'd done to build a powerful research tool with a dual-use interface for all kinds of users. We left a lot of room for expansion and exploration, and our collaboration with research mentors was conducive to generating interesting ideas on how to improve and evolve aesthetic beauty using computational intelligence and programmatic concepts like loops and conditionals embedded into the genetic equations of visual media.

## **Tell us about what you hope to learn this summer and why is hackNY right for you.**

Growing up in New York City, I experienced the hacker and startup culture early on in my education, and it heavily influenced me in my educational pursuits to learn new technologies and build unique and interesting applications. My high school teachers encouraged me and my peers to take advantage of the resources provided by the city and to learn as much as possible, both in breadth and depth, and the advanced courses they taught in systems, networking, and graphics led me to pursue the research that I mention above in the field of computational intelligence and computer graphics. In the years that I've been at the University of Texas at Austin, I've met a large assortment of developers in Austin with just as much dedication to learning and building as anyone I've worked with in New York.

In particular, I was inspired by the hacking community during my first year at UT Austin. HackTX was filled with an assortment of passionate developers, all of whom had outrageously creative and ambitious ideas. Although they may not have had enough time to implement their ideas fully, the sheer amount of effort put into building a complete product in a short time span was something I hadn't seen before. Often, and as was the case in my first year and the years following, the teams came in without an idea and ended up working on a project with technologies that they had to learn as they went. The satisfaction of building and learning in the presence of peers and mentors was addictive, and I came out of hackathons feeling confident in my ability to use these new technologies to build even better projects.

I have grown every year due to these hackathons – my HackTX '13 team continuously strived to improve CodeBench, a website backed by Node.js, Jade, and PostgreSQL, using our own time as well as our time at FB Hack '14, where we extended it using RabbitMQ and Docker to provide secure, asynchronous, arbitrary code compilation and evaluation. These skills were unexpectedly applicable to my following internship at Amazon, where I worked on their distributed RDS and DynamoDB technologies. This year, my team placed third overall at HackTX 2014 with our

LiteTurn hardware hack – automated, gesture-controlled cyclist turn lights using the Myo armband, a Spark Core, and Android GPS bearings. The hack eventually evolved into my course research product for the graduate Wireless Networking course, becoming a study on the use of cheap and efficient consumer devices for automated cyclist lights and general road awareness. It was also my first foray into hardware tinkering, which has become my new unhealthy obsession.

As a New York native, I've seen and experienced the jubilant startup culture, and they are just as dedicated to learning and building as any of the hackers I've met in Austin. I've developed the same tireless desires, and having been offered a spot in last year's hackNY class and having to turn it down due to timing issues, I would jump at the opportunity to join the next one.

## **Is there a particular technology or industry you're currently interested in? How come? Where do you see it heading in the future?**

I've always been particularly interested in the graphics and animation technology used by companies like Blue Sky and Pixar to bring sketches and models to life, both for shorts/movies and commercials. The recent in-house Meander used for "Paperman" is a unique blend of 2-D and 3-D animation using state-of-the-art computer vision, and there was one description of it that got me excited to see where it could go: "it allows you to 'draw' 3D." My most enjoyable courses to date have been Physical Simulation and Animation, and Computer Vision and 3D Reconstruction, both taught by industry professionals who have worked at Disney and Google Street View. Having implemented a system similar to the one used in "Paperman" for a final course project, these two courses have given me a real glimpse into the cutting-edge work that is being done in the graphics, animation, and vision fields to simulate, reconstruct, and share the world around us using sparse, often insufficient information.

On a less research-oriented level, I have been enthralled by the mobile development industry, which has been an inclusive and rapidly-expanding industry. Considering the widespread use of mobile devices, it is very easy for developers to get started and have a reaching impact, and there is a large community of developers eager to provide new mobile services and third-party libraries for both casual and technical users. At the same time, mobile devices are constantly being improved in terms of both hardware and software, and user interfaces are evolving to take advantage of the resources given to them, providing smoother, more pleasant ways to connect and interact with the world around them. With wearables quickly coming into popularity, there has been a concerted effort around technology that takes the experience out of the screen and allows users to interact with the physical world around them, and these devices will allow cheap, widely beneficial applications such as LiteTurn to be universally accessible to a wide range of consumers.

## **Discuss your technical skills/proficiencies/languages and experience.**

I'm experienced with 4-5 years of Java and C/C++ experience and 2+ years of Perl, Python, Ruby/Rails, and Javascript/Node.js experience. I'm also proficient in Haskell, NetLogo, and Scheme.

I've recently worked with Amazon on their distributed RDS and DynamoDB technologies, designing a new database and laying the groundwork for a new top-secret, service-wide safety feature.

For most of the 2013 year, I worked with Austin company Blastro Networks developing their flagship Android apps, and we recently released the Blastro, Roxwel, and Yallwire apps on the Play Store to great reviews. I also conducted evolutionary algorithms research on UT Austin's campus, building a hybrid Java/C++ application backed by OpenGL to render models of evolved, aesthetically-pleasing attractor fractals.

I've been to four hackathons in Austin -- HackTX '12 and '13, where my teams did not place, along with HackTX '14 and the Ebay Hackathon, where my teams won third place.

At Ebay Hack, we developed a Java Swing application, Donation-Z, which utilized PayPal's Adaptive Payments API and allowed gamers to gamble their money away for charity by competing on our weekly leaderboards. At HackTX 2014, we developed a prototype consumer product that used Myo gesture and orientation sensors to detect bicycle turn signal gestures, Android GPS bearing information to detect ending turns, and a wireless Spark Core hooked up to a 24-Neopixel LED ring that acted as turn lights. By the time you read this, we will hopefully have developed a new model, replacing the Myo and Spark Core with a consumer smartwatch and a cheap microcontroller paired with a Bluetooth chip to provide lower energy usage, lower costs, and more accurate recognition using accelerometer data to detect fine-grained user activities such as lane changes and speed shifts.

This year, I've worked with two teams of students who are developing business and consumer applications using IBM's internal Watson system, and who have paired with Atlassian and United Way. They are exciting opportunities and I'm excited about the end products!

## When you're not coding, what do you like to do?

As a New York native, I'm in love with art and theater. I used to do improv in high school, but I spend most of my days watching movies and blasting music with friends. I'm always voyaging for new music to listen to, and occasionally I'll pull out my tablet and illustrate. I'm always up for a game of Ultimate or racquetball. New restaurants and recipes are always on my radar, but in general, I'm on the lookout for new experiences and challenges.

I have recently gotten heavily involved in the Austin and UT biking communities, and one of my favorite parts of the week involve riding out with 300 other Austinites on the Thursday Night Social Ride with music blaring and lights beaming. Austin has become one of the most bike-friendly cities in the country, and having such an inclusive and cohesive community, not only within Austin but within the UT Austin student population itself, has opened me up to truly explore the depths of the city I flew two-thousand miles to live in.

We're looking for applicants who are restless builders. Please provide links and a brief description of at least two code samples in the language of your choice. We greatly prefer code you wrote outside of class—open source projects, side projects, hackathon hacks, professional work, etc. That said, if you have school projects that you think are exceptional, we'd love to see them.

#### **Human-Guided Evolution of Aesthetically-Pleasing Fractals**

<https://github.com/kyeah/Genetic-Fractals>

A research tool studying the generation and evolution of aesthetically-pleasing fractals. It uses crowd-sourced testing along with observational patterns in the mathematical structure of attractor fractals to find optimal constants and equations. Built in C++ and OpenGL, it is meant to be used in conjunction with Tyler Yates' Java Evolution GUI. We started this project as part of UT Austin's Freshman Research Initiative program.

#### **Super Ogre Ball**

<https://github.com/kyeah/Super-Ogre-Ball>

[https://www.youtube.com/watch?v=AjL\\_62PXdfU](https://www.youtube.com/watch?v=AjL_62PXdfU)

A loving recreation of Super Monkey Ball in Ogre3D, built in five weeks for UT Austin's Game Technology course and showcased at Digital Demo Day 2014 with local industry professionals. We implemented a fully-featured dynamic level and mesh-building scripting language with single-player leaderboards and 4-player online matchmaking support. We also ended up building a C++ library to map controls from an undocumented USB gamecube controller, because it's not Super Monkey Ball without a gamecube controller.

#### **LiteTurn**

<https://github.com/kyeah/LiteTurn>

<https://www.youtube.com/watch?v=QdmPOHyUchk>

An automated, gesture-controlled cyclist turn light that uses Myo gesture and orientation sensors to detect turn signal gestures, Android GPS bearing information to detect ending turns and adjust orientation readings, and a wireless Spark Core hooked up to a 24-Neopixel LED ring that acted as turn lights. This started as a hack at HackTX 2014, placing third overall, but evolved into a fully-fledged course research project for a viable consumer product using cheap, efficient, and accessible devices – smartwatches, cheap microcontrollers, and BLE chips – that could act as automated turn lights and replace commonplace headlights and taillights at a small increase in price. We started with a promising concept, and want to make it reliable and viable to make biking safer for both motorists and cyclists.

## CodeBench

<https://github.com/claudiowilson/codebench>

A StackOverflow variation that allows users to submit runnable code solutions to questions, which are run securely and asynchronously on our servers using Docker and RabbitMQ. The solutions are benchmarked and weighted heavily based on their performance relative to other solutions. Initially built at HackTX 2013 using Node.js and PostgreSQL, it was worked on continuously and upgraded substantially at FB Hack 2014 at their Austin office.

## Any free text you'd like us to add when describing you to proposed host startups?

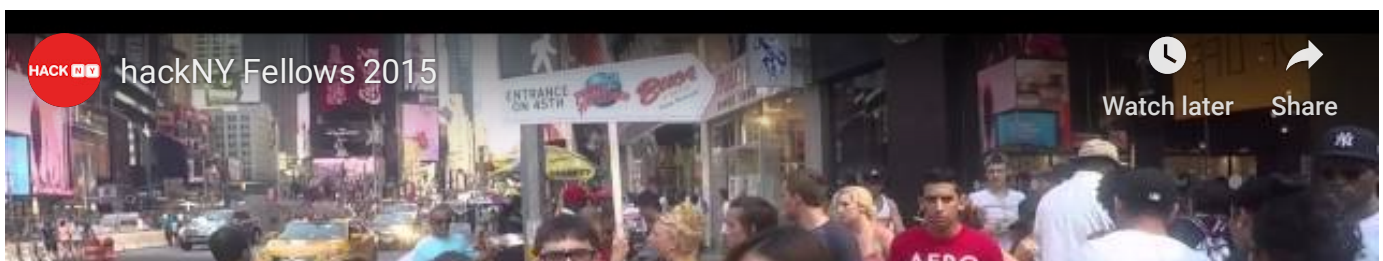
I'm very passionate about working with new technologies: I learned most of my Android development skills working with Blastro for the 2013-14 year; I spent a ton of time working with two classmates to improve upon our HackTX 2013 project, CodeBench, which was backed by a combination of Node.js, Jade, and PostgreSQL, and was extended to use RabbitMQ and Docker; my first hardware hack, LiteTurn, used a Myo armband, a Spark Core, and Android GPS and accelerometer sensors to create gesture-controlled cyclist turn lights, and is currently being revamped with cheaper, more accessible hardware; and I have been going through the growing pains of developing an internal application using IBM Watson and Atlassian Confluence. I love to learn and build on top of complex, foreign technologies!

## Please share anything else you'd like to share about yourself.

I've done a ton of great projects in the past year, and as much as I'd like to cram them all into my application, I have to restrain myself. However, you can read all about some of my past experiences working at Blastro Networks, expanding the scope of my fractals research, and developing cheap, efficient, and reliable cyclist lights at [kyeh.me/blog](http://kyeh.me/blog). I wasn't able to take the offer to join last year's hackNY fellows, but I hope to come back home this year. Thanks!

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I hope that was helpful to some of you wandering souls out there. As a reward for reading, here's an adorable video recap of this year's fellowship:





This video makes me happy.

If you need more inspiration, check out [Simon's post](#) and the many, many wonderful pieces of advice linked at [apply.hackny.org](http://apply.hackny.org). Fellows come from a wide range of backgrounds, interests, and skill levels, and we'd love to get to know you. Maybe we'll see you back in [THE GREATEST CITY IN THE WORLD](#).

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